Process Specification for the Soldering of Electrical Components

Engineering Directorate

Avionic Systems Division

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National Aeronautics and
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Lyndon B. Johnson Space Center
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	REVISION BLOCK	
VERSION	DESCRIPTION	DATE
Baseline	Original version	7/16/96
A	Changed reference document and training requirements.	1/20/98
B	Changed reference documents. Changed structure to meet current PRC template.	8/18/98
C	Changed referenced document from ND-ADM-005 to NT1-ADM-005	8/6/99
D	Changed OPR from EM4 to EV5. Modified note to footer. Changed referenced document from NT1-ADM-005 to ADM-005. Changed referenced document from ANSI/J-STD-001B to IPC/EIA J-STD-001C. Added reference to NASA-STD-8739.2. Modified sections 2.0, 5.0, 6.0, 7.0, 8.0, and 9.0.	6/13/03
E	Modified sections 3.0 and 5.0 to specify solder alloy compositions and flux types used for soldering operations.	11/30/04
F	Modified sections 2.0, 4.0, 5.0, and 6.0. Changed referenced document from IPC/EIA J-STD-001C to IPC J-STD-001. Changed referenced document from ADM-005 to NT-ADM-005.	8/17/06
G	Modified sections 3.0 and 5.0 to specify high temperature solder alloy composition with allowable variations.	3/29/07
H	Remove references to J-STD-001, NASA-STD-8739.2 & NASA-STD-8739.3 and add reference to NASA-STD-8739.6	5/28/13

1.0 SCOPE

This process specification establishes engineering requirements for the soldering of electrical components in hardware manufactured by or for JSC.

2.0 APPLICABILITY

This specification shall be applicable per NASA-STD-8739.6 whenever a soldering procedure is invoked per section 3.0, “Usage”.

3.0 USAGE

This process specification shall be called out on the engineering drawing using a drawing note as follows:

SOLDER COMPONENTS PER NASA/JSC PRC-7001, USING SOLDER ALLOY *<INSERT SOLDER ALLOY>* WITH FLUX *<INSERT FLUX TYPE>*

For regular soldering operations, the following solder alloy shall be called out:

Sn63Pb37 or **Sn60Pb40**

With the following flux type called out:

ROL0 or **ROL1**

For soldering of fine-pitch components, the following solder alloy shall be called out **for the specific operations only**:

Sn62Pb36Ag02

For soldering operations that require high temperature solder, the following solder alloy shall be called out **for the specific operations only**:

Sn96Ag04 (The Tin-Silver alloy composition variation can range from 3% silver by weight to 4% silver by weight)

4.0 REFERENCES

NASA-STD-8739.6	"Implementation Requirements for NASA Workmanship Standards"
NT-ADM-005	"Workmanship Standards Training"

5.0 MATERIAL REQUIREMENTS

As specified in NASA-STD-8739.6.

The following solder alloy compositions and flux types shall be used:

General use solder: Sn63Pb37 (recommended), Sn60Pb40
High temperature solder: Sn96Ag04 (See Section 3.0 for allowable solder alloy composition variation)
Fine pitch component solder: Sn62Pb36Ag02 (recommended)
Flux type: Rosin flux, type R (ROL0) or type RMA (ROL1)

Solder alloy compositions and flux types not listed in Sections 3.0 or 5.0 shall not be used without written approval by the Avionic Systems Division. Lead-free solder alloy compositions (with the exception of Sn96Ag04 as listed) shall not be used.

6.0 PROCESS REQUIREMENTS

Soldering of components shall be accomplished according to the process requirements of NASA-STD-8739.6.

7.0 PROCESS QUALIFICATION

For work performed within Avionic Systems Division, written procedures shall be used and they shall consist of Detailed Process Instructions (DPIs) selected for use from the DPI-7001 series of work instructions. The DPI-7001 series of work instructions shall be validated on non-flight hardware. No untested DPI shall be used to manufacture flight hardware.

8.0 PROCESS VERIFICATION

The soldering process shall be verified by 100% visual inspection to ensure that the solder terminations exhibit full and complete wetting and meet acceptable workmanship criteria.

9.0 TRAINING AND CERTIFICATION OF PERSONNEL

All soldering procedures shall be performed by personnel who have been trained and certified.

a. Through-Hole and Cable/Harness Assembly. Certification as directed by NASA-STD-8739.6 shall be required for solder assembly limited to through hole and cable and harness assembly.

b. Surface Mount (SMT) and Mixed (SMT/PTH) Technology. Certification as directed by NASA-STD-8739.6 shall be required for surface mount electronics and mixed technology assembly.
c. Certification to NT-ADM-005 is acceptable.

10.0 DEFINITIONS

None.